Foodborne Outbreak Detection and Surveillance

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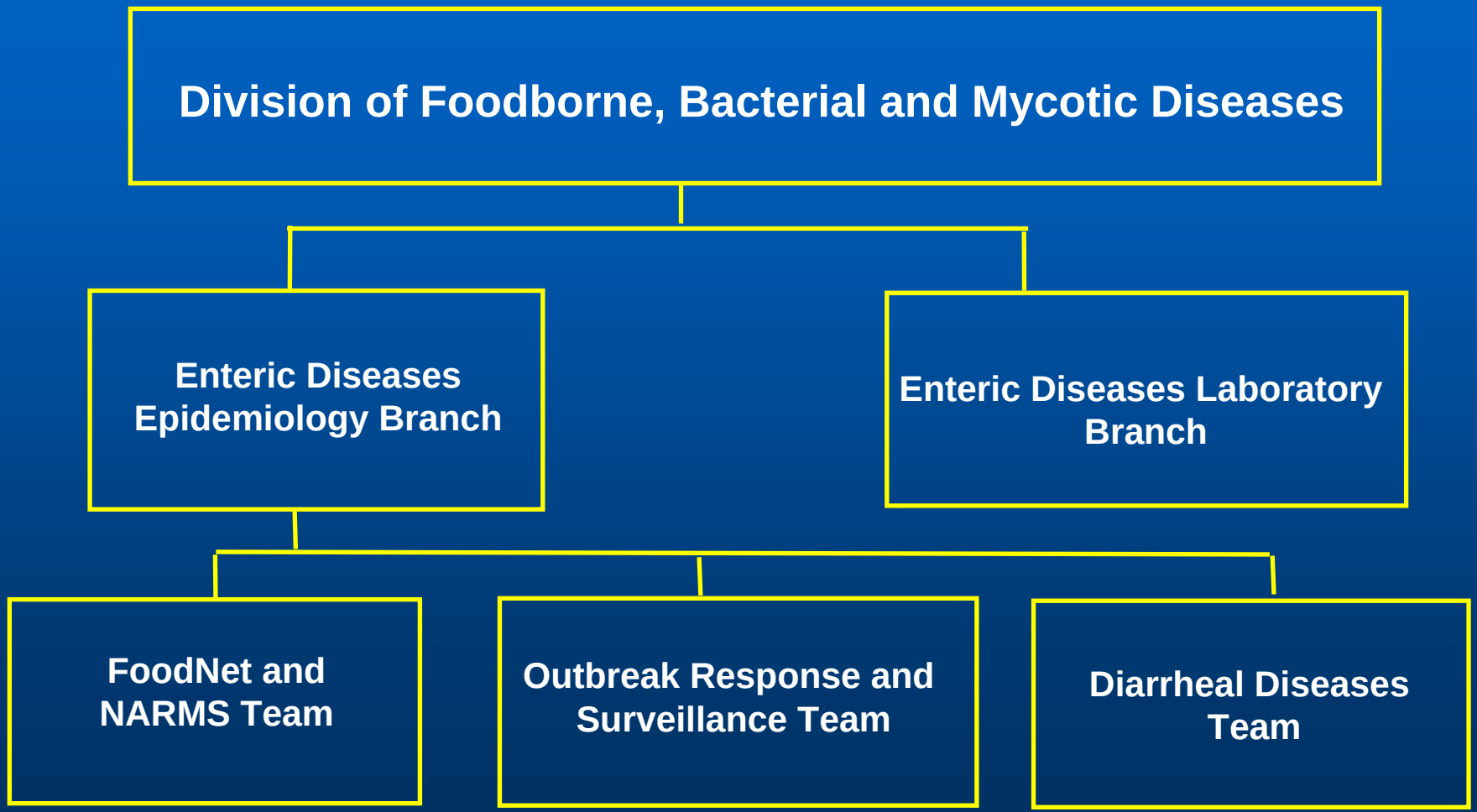
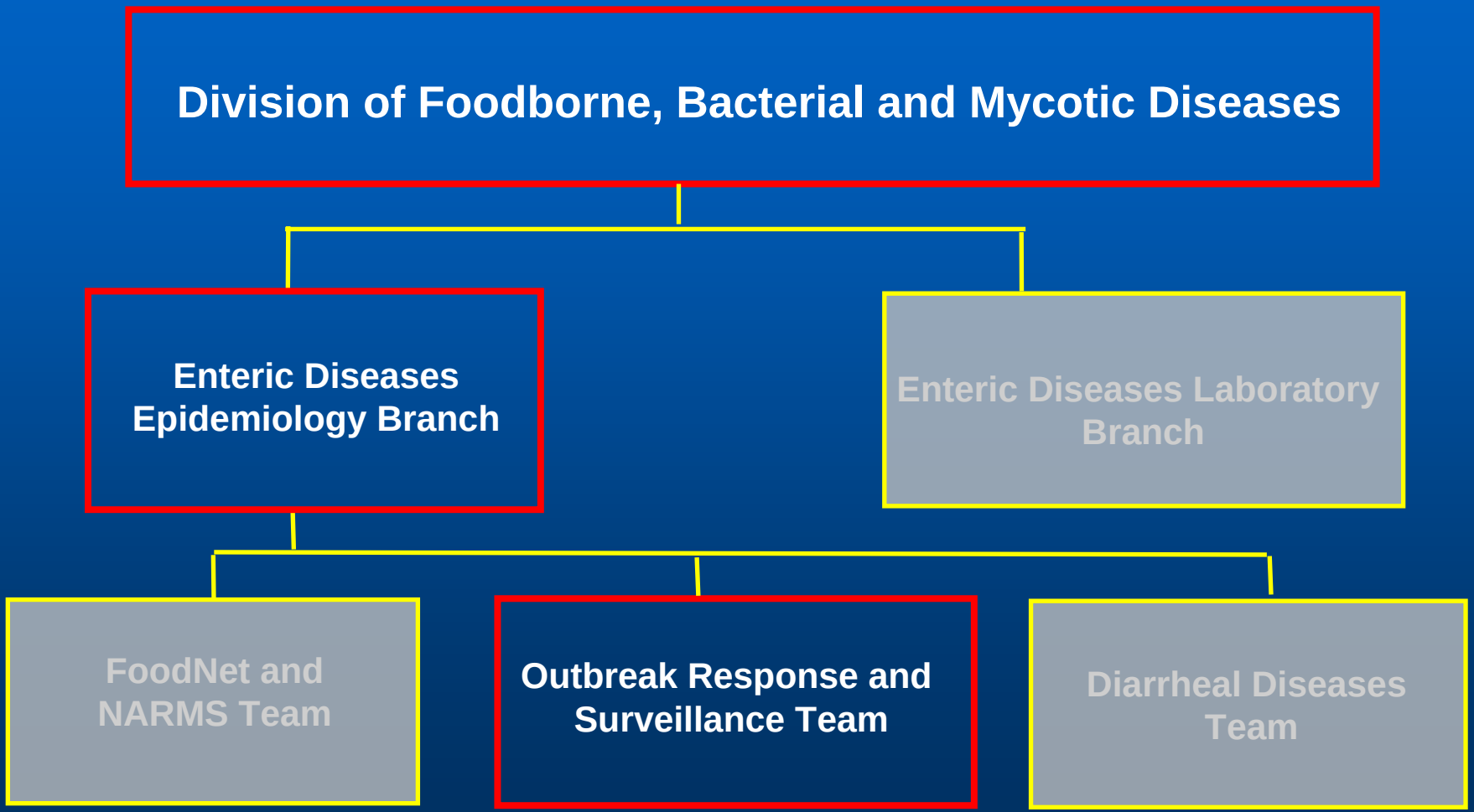
Division of Foodborne, Bacterial and Mycotic Diseases



Division of Foodborne, Bacterial and Mycotic Diseases



Role of the Outbreak Response and Surveillance Team

To investigate outbreaks of foodborne bacterial infections and establish both short-term interventions and long-term control measures to prevent similar outbreaks in the future.

What We Do

- **Outbreak response**
  - Consult on ~200 outbreaks per year
  - Field investigations, ~6 per year
- **National surveillance for foodborne bacterial infections**
  - Outbreaks (eFORS)
  - Case-based (botulism, vibriosis, listeriosis)
- **Special epidemiologic studies**
  - Determine risk factors for illness
  - Determine the burden of foodborne illness
  - Collaborate on studies around the world
- **Provide training and education**
- **Encourage new prevention strategies**
  - Collaborate with food safety agencies and others
  - Develop food safety guidance and support legislation

Surveillance Networks

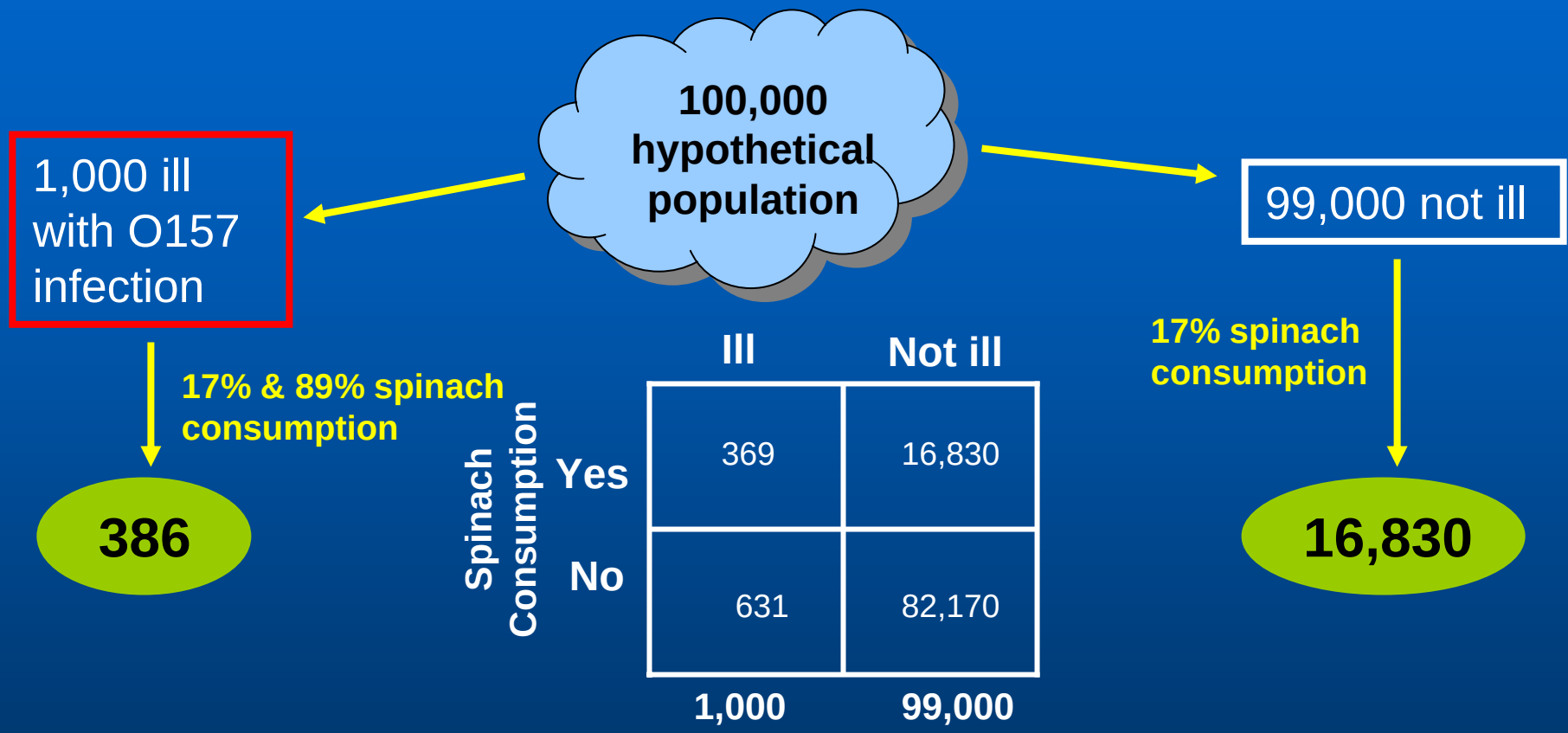
- **OutbreakNet**
  - Network of public health professionals who investigate foodborne disease outbreaks
  - Includes state, local, and federal agencies
- **PulseNet**
  - Network of public health laboratories
  - Uses standardized protocols for subtyping (“DNA fingerprinting”) of enteric pathogens by pulsed-field gel electrophoresis (PFGE)
  - Share results with other state laboratories and epidemiologists through CDC PulseNet database

A large outbreak in one place may be obvious…

Identifying the vehicle…

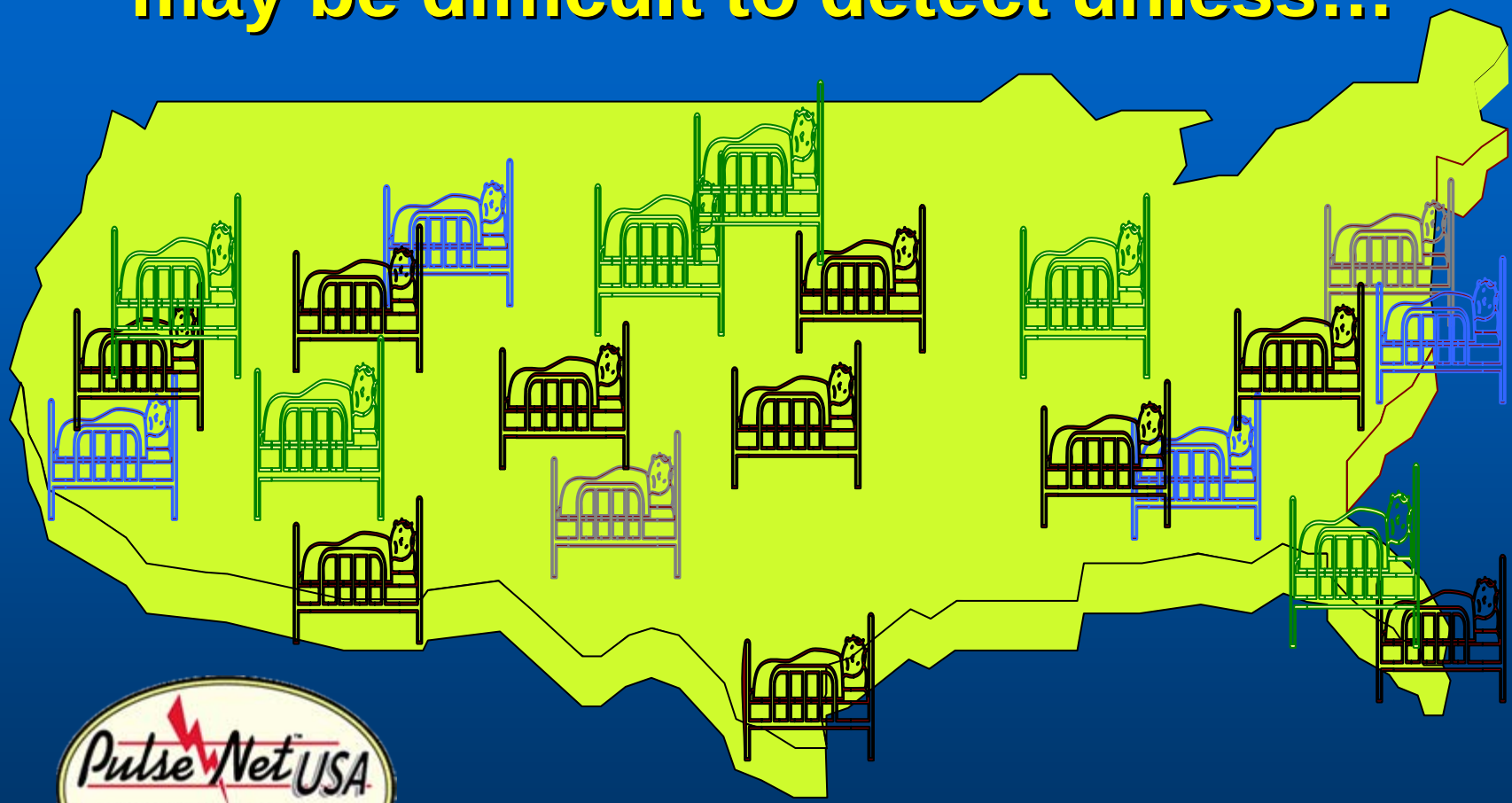
- **Shotgun questionnaire**
  - Hypothesis generation
  - Wide range of food exposures
  - Food exposure frequencies among outbreak cases compared to what is expected in general population
- **Standard targeted questionnaire**
  - Hypothesis testing
  - Specific, targeted questions based on results of shotgun questionnaire
  - Exposure frequencies among outbreak cases compared to exposure frequencies among well persons

2x2 Exposure Table



$$OR = \frac{a*d}{b*c} = \frac{386*82170}{16830*631} = 2.99$$

A dispersed outbreak in many places may be difficult to detect unless...

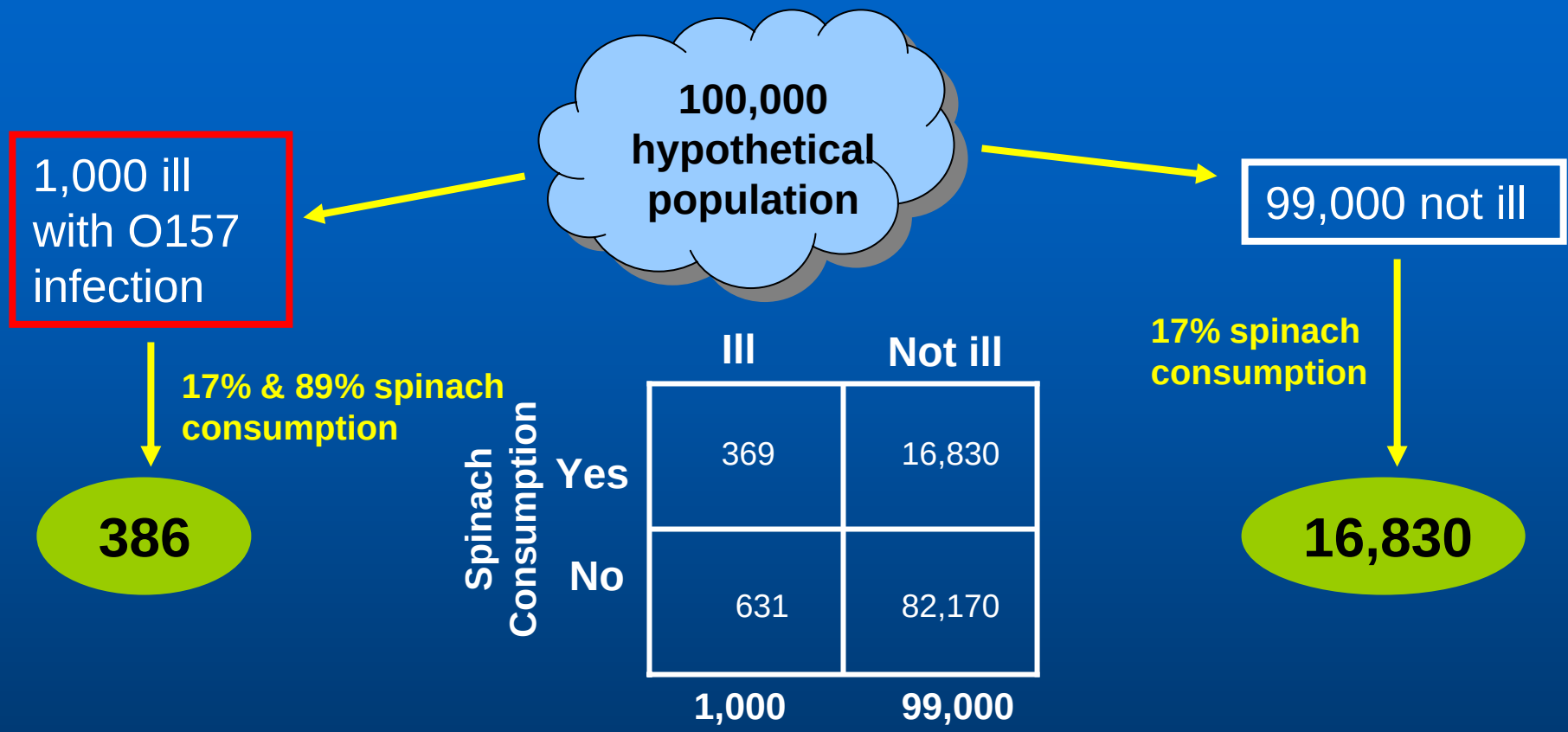


PulseNet USA
The National Molecular Subtyping Network for Foodborne Disease Surveillance
CDC

The Role of PulseNet in Outbreak Investigations

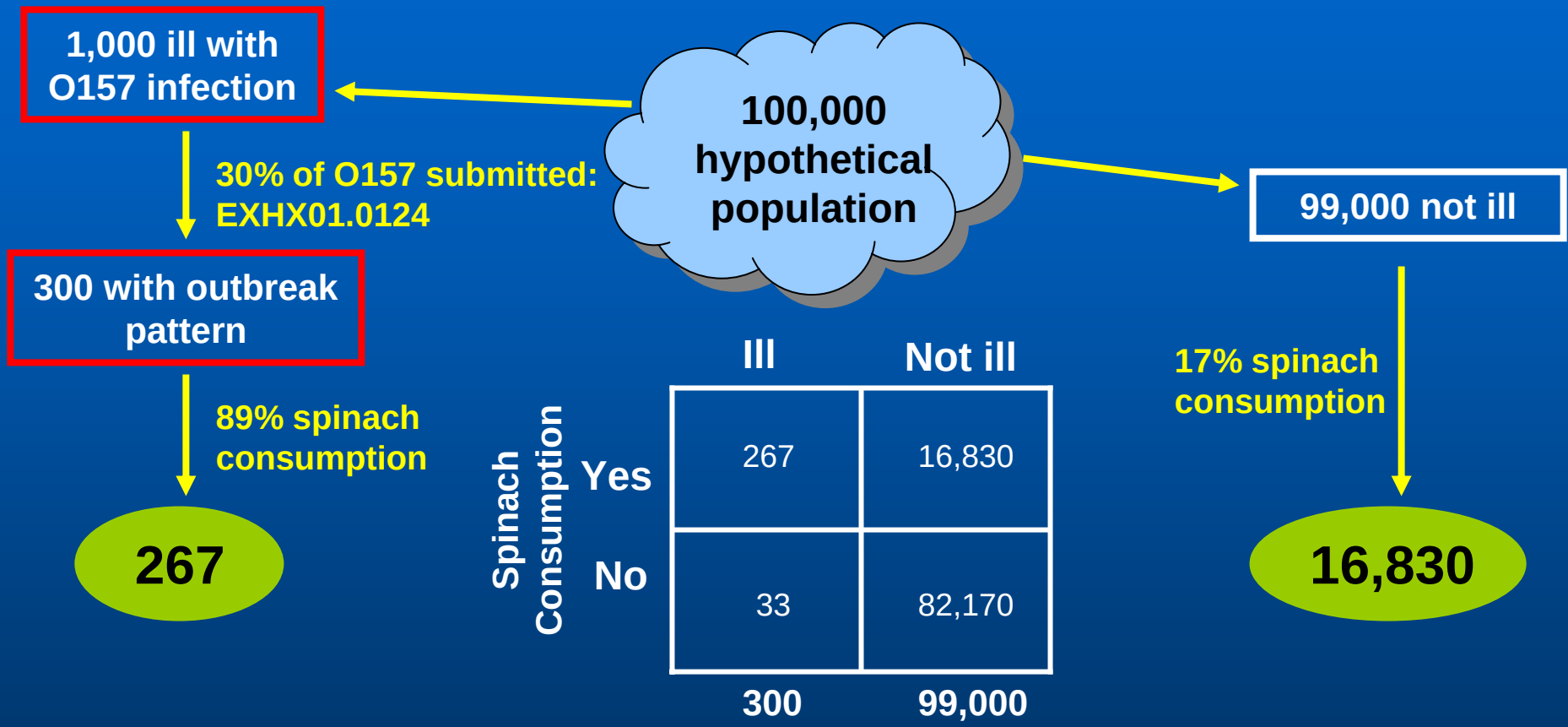
- **PulseNet is a *cluster* identification tool, not an outbreak detection tool**
  - **PFGE cluster :** 2 or more *bacterial isolates* with an identical DNA fingerprint
  - **Foodborne outbreak:** 2 or more *human cases* sharing a common food exposure
- **Improves efficiency of epidemiologic investigation**
- **Strengthens accuracy of statistical analysis**

2x2 Exposure Table



$$\text{OR} = \frac{a*d}{b*c} = \frac{386*82170}{16830*631} = \mathbf{2.99}$$

With *specific* PFGE information…

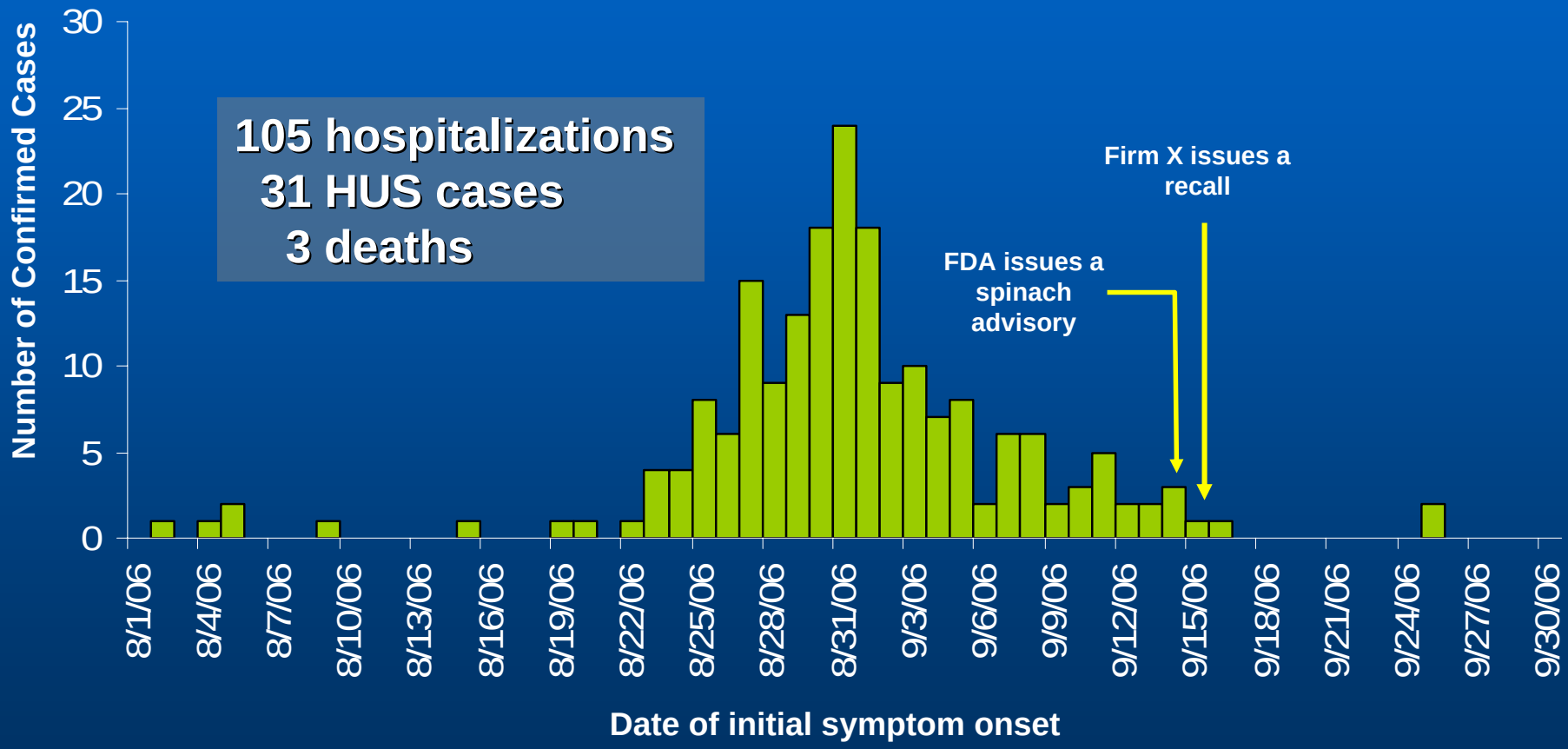


OR= a*d = 267*82170 = **39.5**
b*c 16830*33

Epidemic Curve of Cases:

O157 Infections Associated with Consumption of Fresh Spinach

August – October, 2006



Impact of Public Health Response: Too Little, Too Late?

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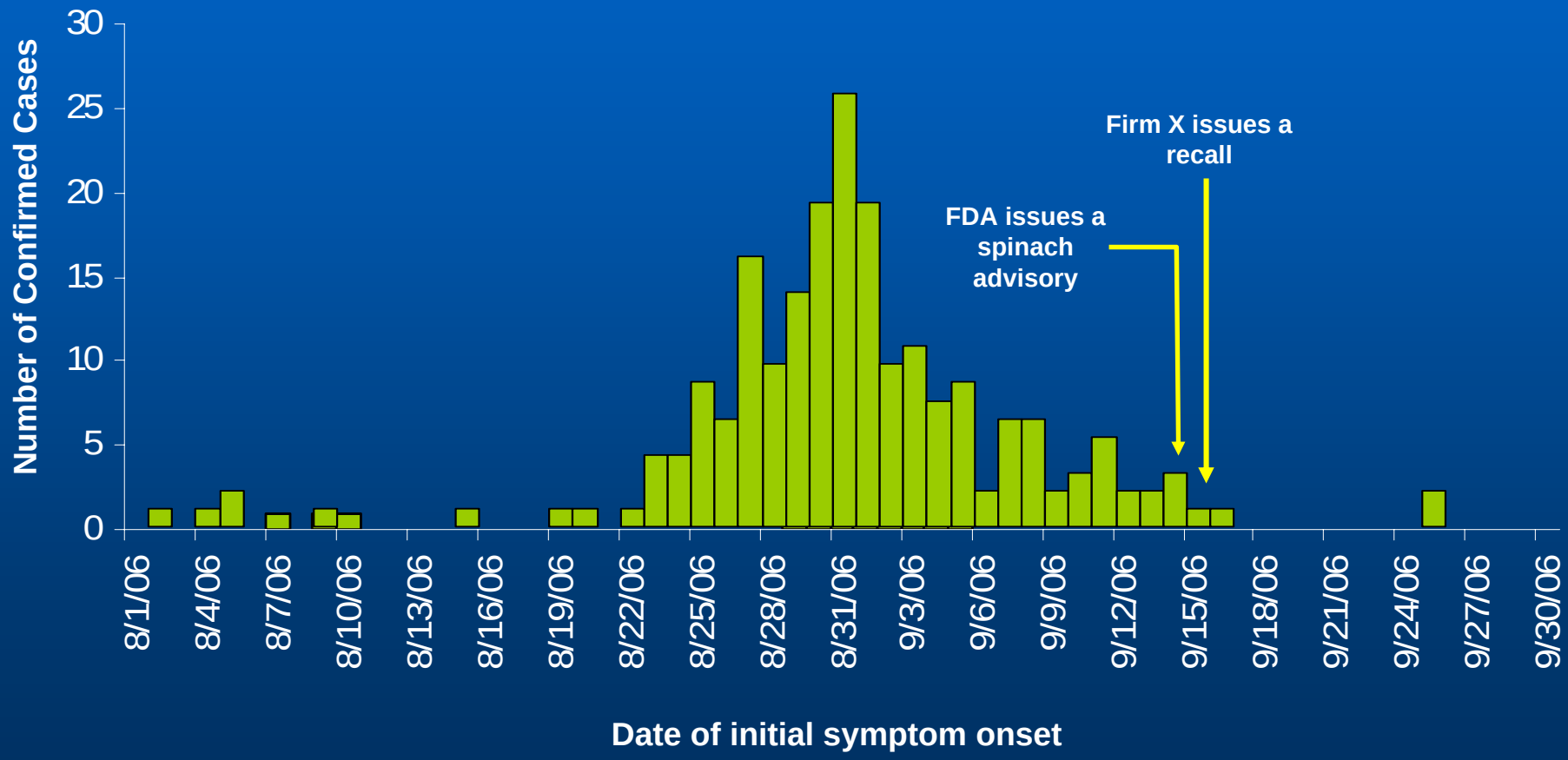

Impact of Public Health Response: Too Little, Too Late?

- Removed potentially contaminated spinach from homes
- Encouraged ill persons to seek medical care
- Media attention fueled public awareness of produce as a potential vehicle for transmission of *E. coli* O157

It’s Not Magic!

- **PulseNet assists epidemiologists:**
  - Identify potential widespread outbreaks sooner
  - Increase efficiency of epidemiologic investigations
  - Strengthens accuracy of statistical analyses
- **Outbreak investigation still driven by shoe-leather epidemiology**

Thank you

http://www.cdc.gov/foodborneoutbreaks